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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): R. KAJIWARA, et al

Serial No.: 09/493,080

Filed: January 28, 2000

For: SEMICONDUCTOR DEVICE

Group: 2811

Examiner:



PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

August 18, 2000

Sir:

The following preliminary amendments and remarks are respectfully submitted in connection with the above-identified application.

IN THE SPECIFICATION:

Please replace the original specification with the attached Substitute Specification.

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IN THE CLAIMS:

Please amend the claims as follows:

1. (amended) A semiconductor device comprising:
a semiconductor substrate[,]; and
a semiconductor element which comprises[;]:

A1
Contd

A1
Concl'd

a first electrode provided on a front plane of said semiconductor substrate, and a second electrode provided on a rear plane of said semiconductor substrate[,]i

a first metallic member connected to said first electrode[,]i and

a second metallic member connected to said second electrode[,]i wherein:

 said first electrode is connected to said first metallic member via a first metallic body including a first precious metal, and

 said second electrode is connected to said second metallic member via a second metallic body including a second precious metal.

claim 2, line 4, after "with" insert --an--;

line 5, delete "a" insert --the--.

4. (amended) A semiconductor device as claimed in any of claims 1 and 2, wherein:

A2

 said first metallic body [is] has plural projecting convex electrode terminals [protruded] which protrude from any of said first electrode and said first metallic member, and

 said plural projecting convex electrode terminals are distributed on substantially the whole bonding interface between said first electrode and said first metallic member with substantially the same intervals.

Claim 5, line 2, delete "from"; same line 2, delete "to
4" insert --and 2--;

\ line 3, after "on" insert --a--.

Claim 7, line 3, after "bonding" insert --to--.

Claim 8, line 4, after "temperature" insert --of--; same
line 4, after "400°C," insert --and--.

Claim 9, line 6, delete "respective" insert --each--.

Claim 10, line 6, after "at" insert --a--.

Claim 12, line 6, after "at" insert --a--.

13. (amended) A semiconductor device comprising:

A3
Contd
a semiconductor substrate[,]i and

a semiconductor element which comprises[;]i

a first electrode provided on a front plane of said
semiconductor substrate, and a second electrode provided on a
rear plane of said semiconductor substrate[,]i

a first metallic member connected to said first
electrode[,]i and

a second metallic member connected to said second
electrode[,]i wherein:

said second electrode is connected to said second
metallic member via a metallic layer containing precious
metal, and

said metallic layer is composed by bonding to each other
a precious metal layer provided at the bonding front plane of

Q3
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said second electrode with a precious metal layer provided at the bonding front plane of said second metallic member.

14. (amended) A semiconductor device comprising:
a semiconductor substrate[,]; and
a semiconductor element which comprises[;];
a first electrode provided on a front plane of said semiconductor substrate, and a second electrode provided on a rear plane of said semiconductor substrate[,];
a first metallic member connected to said first electrode[,]; and
a second metallic member connected to said second electrode[,]; wherein:
said second electrode is connected to said second metallic member via a metallic layer containing precious metal, and
said metallic layer is an alloy layer having a solidus line temperature of at least 400°C, and which contains a precious metal as a main component.

15. (amended) A semiconductor device comprising:
a semiconductor substrate[,]; and
a semiconductor element which comprises[;];
a first electrode provided on a front plane of said semiconductor substrate, and a second electrode provided on a rear plane of said semiconductor substrate[,];

A3
a first metallic member connected to said first electrode[,]*i* and

Cond
a second metallic member connected to said second electrode[,]*i* wherein:

 said first metallic member comprises plural portions extended from a portion having a bonding portion with said first electrode[,]*i* and

 [respective] each of said plural portions comprises a surface portion for connecting with an external line.

Claim 17, line 3, delete "bodie" insert --bodies--;
line 4, delete "pads"; same line 4, after "point"
insert --of--.

A4
Cont
19. (amended) A semiconductor device comprising:
 a semiconductor chip[,]*i* and
 a metallic member connected to a chip electrode, wherein:
 said chip electrode is composed of any of an Al film and
 an Al alloy film[,]*i*
 a bonding front plane of said metallic member is composed
 of a plated precious metal film[,]*i*
 said chip electrode is bonded metallically to said
 metallic member via Au bumps[,]*i* and
 [said Aluminum] an aluminum film of more than 80% in area
 of an Au/Al bonding region is made all of an Au/Al alloy layer
 in the thickness direction.

20. (amended) A semiconductor device comprising:

a semiconductor chip[,],i

a first metallic member connected to a chip rear plane electrode[,],i

a second metallic member connected to a main current electrode on a circuit forming plane of the chip[,],i and a third metallic member connected to a control electrode[,],i wherein:

said main current electrode and said control electrode are composed of any of an Al film and an Al alloy film[,],i

plural Au bumps are formed on [respective of] the Al electrode film in a metallically bonded condition[,],i

[respective] each of said second and third metallic members, which [is] are plated with a precious metal, has such a structure that said metallic member is bonded with said Au bumps by compression bonding, and gaps between said metallic member and said chip are filled with resin[,],i and

a plane of said first metallic member opposite to said chip in the plane of chip projection, and planes of said second and third metallic members opposite to said chip are exposed to the surface of said semiconductor device.

Claim 21, line 3, after "to" insert --a--;

line 7, after "and" (first occurrence) insert --a--;

line 8, delete "such a structure is composed that".

Claim 22, line 3, delete "respective" insert --each--;

line 6, after "metallically" insert --to--.
Claim 23, line 6, delete "are" insert --is--.

IN THE ABSTRACT OF THE DISCLOSURE:

Line 4, after "of" insert --a--;
line 5, after "containing" insert --a--;
line 7, after "containing" insert --a--.

REMARKS

The specification has been amended to correct errors of a typographical and grammatical nature. Due to the excessive corrections thereto, applicants submit herewith a Substitute Specification, along with a marked-up copy of the original specification for the Examiner's convenience. Applicants submit that the substitute specification includes no new matter. Therefore, entry of the Substitute Specification is respectfully requested.

The claims and abstract have been amended to correct errors of a grammatical nature and to more clearly describe the features of the present invention.

Also submitted herewith is a proposed amendment to the drawings. Upon receipt of the approval of the amendment to the drawings and receipt of a Notice of Allowance, the proposed drawing corrections will be effected in accordance with present practice.

Entry of the preliminary amendments and examination of the application is respectfully requested.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (503.38097X00) and please credit any excess fees to such deposit account.

Respectfully submitted,



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Attachments
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